

IN THE SPECIFICATION

Please replace the paragraph on page 1, line 3, with the following paragraph:

The present invention relates to a process for the treatment of ~~wood~~wood. More particularly, the invention relates to a process for impregnating wood with a treatment solution, the process involving applying a vacuum to the wood and subsequently pressurizing the wood in a treatment solution to partially impregnate the wood with the treatment solution. Pressure is then reduced and treatment solution concurrently removed from the vessel in which the wood is being treated.

Please replace the paragraph on page 1, line 10, with the following paragraph:

Steam conditioning of green timber or roundwood (for example radiata pine (Pinus radiata D. Don.) under pressure (at approximately ~~1270~~127° C) in preparation for preservative impregnation has been used for approximately 40 years in New Zealand and Australia. The success of steam conditioning arises from the rupturing of soft radial tissue and moisture loss after steaming and the very high standard of preservative distribution that can be achieved following pressure impregnation.

Please replace the paragraph on page 1, line 17, with the following paragraph:

Steam conditioning generally requires a minimum holding period of 12-24 hours before an alternating pressure method treatment (APM) with copper-chrome-arsenic (CCA) preservatives can be employed, or 7-21 days of air drying after steaming (depending on the diameter of pole and weather conditions) if a ~~Bethe~~Bethell treatment is to be used. These holding periods are needed to achieve moisture losses (up to 300 l/m.sup.3) that will provide an adequate treatment standard.

Please replace the paragraph on page 2, line 7, with the following paragraph:

~~Referring to FIG. 1, the~~The Bethell treatment comprises a vacuum/pressure/vacuum treatment as follows:

Please replace the paragraph on page 2, line 9, with the following paragraph:

A) The wood is placed in a retort and evacuated by B (Typically – 85 ~~kpa~~ kPa).

Please replace the paragraph on page 2, line 10, with the following paragraph:

B) The wood is held under vacuum until C (typically 30 ~~minutes~~ minutes).

Please replace the paragraph on page 2, line 29, with the following paragraph:

~~Referring to FIG. 2, the~~ The Lowry treatment is similar to Bethell treatment, except an initial vacuum is not drawn. This results in air being trapped in the wood which is compressed during treatment leading to preservative recovery after treatment and extended kick back.

Please replace the paragraph on page 3, line 1, with the following paragraph:

~~Referring to FIG. 3, in~~ In the Rueping treatment an initial air pressure ~~[[A-B]]~~ is ~~imposed~~ imposed. This increases preservative recovery during kickback ~~F-G-H~~ but also extends the dripping time more than 24 ~~hrs~~ hours after the treated timber is removed from the treatment plant.

Please replace the paragraph on page 3, line 20, with the following paragraph:

An additional problem with traditional treatment methods (~~Bethel~~, Bethell, Lowry, and Rueping schedules and variations of these treatments) is that there is inevitable dripping of preservative when the treated timber is removed from the treatment vessel. This requires the treated timber to be placed on a drip pad. All of these treatments apply a vacuum after treatment to accelerate the recovery of excess preservative that might lead to dripping. This vacuum is successful in reducing the total amount of potential dripping. However, dripping is inevitable as the air trapped in the wood during treatment continues to expand for several hours after removal from the treatment plant. This leads to potential contamination of the treatment site. Research undertaken by the present inventor has indicated that the primary causes of environmental contamination arise from extended dripping and the extent to which preservative components are fixed in the wood during the period of dripping.

Please replace the paragraph on page 4, line 19, with the following paragraph:

whereby immediately after said reduction of pressure within the treatment vessel, the partially impregnated wood includes an unimpregnated inner zone which has a residual vacuum ~~elevating~~allevating seepage of treatment solution from the partially impregnated wood.

Please replace the paragraph on page 7, line 21, with the following paragraph:

Green radiata pine which has been steam conditioned to improve permeability and reduce wood moisture content will have an air void volume available for preservative treatment of approximately 280-320 l/m.sup.3. If the expected uptake of preservative is 300 l/m.sup.3 for a traditional ~~Bethe~~Bethell process, then one might expect to recover say 20 l/m.sup.3 by applying a final vacuum on the treated timber. Further dripping will then occur. In the process of the invention the treatment would, for example, be terminated once a gross uptake of 270 l/m.sup.3 has been achieved. Research has shown that the residual vacuum in the wood will continue to pull preservative into the wood to achieve similar preservative distribution in the timber but without the need for excessive final vacuum times and without dripping. Clearly further optimisation of the treatment may show that it is possible to reduce gross preservative up to 260 l/m.sup.3 without affecting the standard of treatment.

Please replace the paragraph on page 8, line 1, with the following paragraph:

When radiata pine is kiln dried and a ~~Bethe~~Bethell treatment is applied it is possible to achieve preservative uptakes of the order of 550-650 l/m.sup.3. However the application of a Rueping treatment where there is substantial recovery of preservative after pressure impregnation, net uptakes as low as 200 l/m.sup.3 can be achieved and still meet total sapwood penetration in roundwood and sawn timber. In this example it is possible to apply preservative by the process of the invention to levels of gross uptake as low as 200 l/m.sup.3 and achieve preservative penetrations comparable to the Rueping process but without the concomitant contamination of preservative with wood sugars and without excessive preservative dripping after treatment. This represents a major advancement in controlling the environmental problems associated with wood preservation.

Please replace the paragraph on page 8, line 13, with the following paragraph:

In the case of LOSP treatments gross uptakes of preservative into dry radiata pine of the order of 30-50 l/m.sup.3 are desirable. This is achieved through a range of processes ranging from ~~Bethel~~Bethell, Lowry and Rueping treatment or Double Vacuum. The objective is to achieve as low an uptake as possible whilst retaining as high a sapwood penetration as possible. In the case of the process of the invention, the plant operator will apply a vacuum and pressure to achieve close to 30 l/m.sup.3 and then terminate treatment. This uptake will further distribute into the wood under the residual vacuum. However with the process of the invention there is no need to recover preservative using a final vacuum.

Please insert the following paragraph before the paragraph beginning on page 11, line 24:

Embodiments of the invention will now be described in more detail with reference to the Examples.

Please replace the paragraph on page 11, line 24, with the following paragraph:

~~the~~The process of the invention utilises the same vacuum as a traditional ~~Bethel~~Bethell process (A-B-C). The rapid application of vacuum to the treatment vessel may be achieved by opening a reservoir of vacuum maintained in the vacuum cylinder to the treatment vessel. However, only a relatively short pressure time E-F to apply a specified quantity of preservative is needed to meet a required preservative retention and distribution. The preservative is emptied while maintaining some pressure in the treatment vessel, i.e. the pressure in the treatment vessel is used to accelerate the rate of movement of chemical in the treatment vessel back into the storage vessel. Excessive air pressure is avoided so that air is not forced into the surface of the treated timber. When the treatment vessel is empty and the pressure released, the treated charge of timber can be removed from the vessel without further vacuum.

Please replace the paragraph on page 12, line 20, with the following paragraph:

Kiln dried radiata pine sapwood measuring 95.times.45 mm in cross section was placed in a retort ~~as indicated in FIG. 1~~. The plant comprised a door at both ends of the treatment vessel to facilitate easy entry and discharge from the vessel. A conveyor belt loading and unloading

system provided rapid charge loading and unloading. Evacuation of the wood was achieved using a vacuum ~~reservoir~~ ~~(a~~reservoir, a separate vessel that had been evacuated prior to the charge entering the treatment vessel and the doors closing. The wood was instantly evacuated and the vacuum maintained at -85 kPa. gauge for 25 seconds. Preservative solution was then flooded into the treatment plant by opening valves between the storage tank and treatment vessel. Rapid transfer of preservative solution (in this case a 2% solution of trimethyl borate mixed with 50:50 linseed oil and kerosene) was achieved by opening a number of large diameter pipes between the storage vessel and treatment vessel. Rapid transfer of preservative was ~~aided because~~ aided because of the vacuum in the treatment vessel, but also because the preservative was pressurized in the store vessel. Filling of the treatment vessel took 4 seconds. Because of the air pressure used to transfer preservative from the store tank to the treatment plant, once the treatment vessel was full of preservative it immediately came on to pressure. Once a predetermined pressure had been achieved, in this case 5 kPa (gauge), and a gross uptake of chemical had been achieved, in this case 30 l/m.sup.3, the pressure was released and the preservative solution emptied into a storage vessel in approximately 4 seconds.

Please replace the paragraph on page 14, line 17, with the following paragraph:

The scoping trials also tested the feasibility of steam evacuation to meet adequate moisture loss in roundwood prior to preservative impregnation. Steam evacuation has been used previously to accelerate the loss of moisture after steam conditioning, however the timber or roundwood is allowed to cool when treated with CCA because of sludging of the CCA solution when it becomes heated. Normally the Steam Conditioning/APM treatment method is applied to steam conditioned wood which is cool and left for at least 12-24 hours or in the case of ~~Bethel~~ Bethell treatment has been left for at least 7 days to achieve moisture loss (300 l/m.sup.3) from the green condition and moisture redistribution. The objective of the scoping trials was to determine whether adequate moisture loss could be achieved by steam evacuation immediately after steaming. Two schedules were examined and compared.